SUPPORT FOR THE AMENDMENT

Support for the amendment to claim 1 is found in claim 1 as originally presented. No new matter would be added to this application by entry of this amendment.

Upon entry of this amendment claims 1-5 and 9-13 will remain active in this application.

REQUEST FOR RECONSIDERATION

The claimed invention is directed to a polyester resin composition for a toner.

Applicants wish to thank Examiner Ronesi for the helpful and courteous discussion held with their U.S. representative on October 4, 2005. At that time, Applicants' U.S. representative argued that forming a polyester resin by condensing raw material monomers in the presence of a tetra-substituted titanium catalyst and **an inorganic phosphorous compound** yielded improved properties which are useful when used as a toner binder as compared with condensation in the presence of an organic phosphorous compound. The following is intended to expand upon the discussion with the examiner.

Polyester resins have been used as binder resins for toners. The increased demand for color toners have highlighted some properties of polyester resins which are undesirable. More specifically, color reproducibility combined with durability can be difficult to obtain with a polyester resin. Accordingly, polyester resins suitable for binders in color toners are sought.

The claimed invention addresses this problem by providing for a polyester resin composition in which raw material monomers are condensed in the presence of a tetra-substituted titanium catalyst and **an inorganic phosphorous compound**. Applicants have discovered that such a combination of components provides for a polyester resin which gives

good performance in a colored toner binder. Such a polyester resin is neither disclosed nor suggested in the cited prior art of record.

The rejections of claims 1-3, 12 and 13 under 35 U.S.C. § 102(b) over Barkey (U.S. 5,217,440), of claims 1-3, 9 and 13 under 35 U.S.C. § 102(b) over Kawase et al U.S. 3,953,539, of claims 1-5 and 13 under 35 U.S.C. § 102(b) over Harazoe et al U.S. 5,519,112, of claims 1-3 and 13 under 35 U.S.C. § 102(b) over Adams et al U.S. 5,681,918 and under 35 U.S.C. § 103(a) over the references cited above in combination with Shiraldi U.S. 5,922,828 are respectfully traversed.

None of the cited prior art of record discloses or suggests an improvement in properties for a polyester resin produced by condensing raw material monomers in the presence of a tetra-substituted titanium catalyst and **an inorganic phosphorus compound** as compared with an organic phosphorous compound.

Barkey describes the formation of a polyester in the presence of a transesterification catalyst such as a titanium, zinc or manganese compound including a tetraisopropyl titanate (column 6, lines 30-57). The reference describes that highly reactive catalysts may be reduced by adding end capping agents, poorly reacted polymer precursors or catalyst poisons or deactivators, such as phosphoric acid, tributyl phosphate, phorphorous acid and trimethylphosphate (column 7, lines 11-14 and 26-27). There is no suggestion of any difference in performance by using an inorganic phosphorous compound as compared with an organic phosphorus compound. Moreover, in each of the three examples in which a titanium catalyst is used, there is no illustration of the use of any catalyst poison. Therefore the reference fails to suggest using a catalyst poison such as a phosphoric acid with a titanium catalyst since there is ample evidence that titanium catalysts are not sufficiently reactive to require the use of a poison.

In contrast, the present invention is directed to a polyester resin composition prepared by condensing a raw material monomer in the presence of a titanium catalyst of a specified structure and an **inorganic** phosphorus compound. Applicants have discovered that improved properties in terms of performance in a toner are observed using the combination of a titanium catalyst as claimed, with an inorganic phosphorous compound.

As evidence of the improved performance, the examiner's attention is directed to Table 3 on pages 25 and 26 of the specification. For the examiner's convenience a portion of the data from table 3 is reproduced below:

	Raw Material Monomer Composition	Catalyst		Phosphorous Compound		Tm (°C)	Tg (°C)	Degree of Coloration	Durability	Color Reproducibility
		Kind	Amount used	Kind	Amount used					
Comp. Ex 1	A	C1	0.3	-	-	101.2	64.3	x	◎	x
Comp. Ex 4	A	C1	0.001	P1	0.3	100.5	63.2	○	x	○
Ex. 5	A	C1	0.01	P1	0.01	99.8	63.1	○	○	○
Ex. 1	A	C1	0.3	P1	0.3	101.6	64.0	○	◎	◎
Ex.4	A	C1	3.0	P1	3.0	102.7	64.8	Δ	◎	○
Ex.6	A	C1	0.05	P1	0.55	100.3	65.1	◎	○	◎
Comp Ex. 2	A	C1	0.3	P1	6.0	102.1	64.0	◎	x	◎
Comp Ex. 3	A	C1	5.0	P1	0.3	101.5	63.9	Δ	○	x
Comp. Ex. 7	C	C4	0.3	-	-	103.8	62.7	x	x	○
Comp. Ex. 8	C	C1	0.3	-	-	105.2	63.5	x	○	x
Ex. 10	C	C1	0.3	P1	0.3	105.1	63.2	x	◎	○
Ex. 2	A	C1	0.3	P2	0.3	103.1	65.2	○	◎	○
Ex. 3	A	C1	0.3	P3	0.3	102.6	64.9	○	◎	○
Ex. 7	A	C2	0.3	P1	0.3	103.4	64.3	○	○	◎
Ex. 8	A	C3	0.3	P1	0.3	102.1	63.2	Δ	○	○
Comp. Ex. 5	A	C4	0.3	-	-	103.1	64.2	○	x	○
Comp Ex. 6	A	C4	0.3	P1	0.3	98.6	63.3	○	x	○
Ex. 9	B	C1	0.3	P1	0.3	107.3	65.1	○	◎	◎
Ex. 11	D	C1	0.3	P1	0.3	137.3	67.3	x	◎	○
Ex. 12	E	C1	0.3	P1	0.3	110.7	64.8	Δ	◎	◎
Ex. 13	F	C1	0.3	P1	0.3	112.8	58.8	○	○	◎
Ex. 14	G	C1	0.3	P1	0.3	112.3	114.6	○	◎	○
Ex. 15	H	C1	0.3	P1	0.3	143.1	66.2	○	◎	○
Ex 16	E	C1	0.3	P1	0.3	112.3	65.3	Δ	◎	◎
Comp. Ex. 9	A	C1	0.3	P4	0.3	98.8	64.2	Δ	x	x

Comp. Ex 9, an example in which a titanium catalyst is used with an organic phosphorous compound, triphenyl phosphine, exhibited increased coloration and reduced durability and color reproducibility. In contrast, example 1, differing in terms of only the phosphorous compound being an inorganic phosphorous, polyphosphoric acid, demonstrated reduced coloration and increased durability and color reproducibility. Moreover, applicants' data illustrated a general improvement in properties for the variety of titanium catalysts of titanium diisopropyl bis(triethalolaminate), tetrastearyl titanate, tetrabutyl titanate as well as the variety of inorganic phosphorous compounds of polyphosphoric acid, sodium polyphosphate and sodium ultrapolyphopshate, and is compared with the absence of a phosphorous compound, an organic phosphorous compound as well as when using a tin catalyst. The data shows that when an inorganic phosphorus compound is used in conjunction with a titanium compound as claimed, that improved performance in terms of color and durability are observed in contrast to when an organic phosphorous compound is used. As such applicants have demonstrated an improved property useful in toner resin applications from the claimed combination.

The remaining cited references fail to suggest any improvement in resin properties by selecting an inorganic phosphorous compound in a polymerization of monomers.

Kawase et al. merely describes the use of a phosphorous compound to inhibit coloration of a blend of polyester resin with polycarbonate resin. (column 3, lines 31-33). Suitable phosphorous compounds include inorganic phosphorous compounds such as phosphoric acid as well as a vast number of organic phosphorus compounds which include triphenyl phosphine (column 4, line 14). There is no suggestion that selection of an inorganic phosphorus compound would yield an improved result. The data discussed above demonstrates an improved performance by using a polymerization system as claimed. In addition, the described titanium catalysts are broader than the claimed amino and oxy

substituted titanium catalyst and include titanium tetrachloride, titanium oxalate and potassium titanate fluoride, titanium compounds which are not within the scope of the claims.

Harozoe et al. describes a method of manufacturing a polyester comprising esterifiying a dicarboxylic acid with a dihydroxyl compound, followed by a liquid phase polycondensation using a polycondensation catalyst (see abstract). There is no suggestion to condense **raw material monomers** in the presence of a titanium catalyst, but rather monomer condensation is conducted in the presence of a basic compound (column 4, lines 31-42). While the reference describes a polycondensation catalyst which includes germanium, antimony and titanium compounds (column 5, lines 1-6), there is **no suggestion to conduct monomer condensation** in the presence of a titanium compound. Moreover, while the polycondensation catalyst may further contain a stabilizer such as an organic phosphate or polyphosphoric acid, these phosphorous compounds are not used to condense monomers, but rather for polycondensation. Further, the reference fails to suggest an improvement in resin properties by selection of an inorganic phosphorous compound over an organic phosphorous compound.

Adams et al., U.S. 5,681,918, like Harazoe et al., describes a post condensation catalyst system using catalyst such as titanium, germanium and antimony (column 3, lines 38-53). A phosphorous stabilizer such a phosphoric acid or alkyl ester thereof may be used (column 3, lines 54-60). As such this reference fails to suggest a catalyst for **monomer condensation**, nor any suggestion of an improvement in resin properties by selection of an inorganic phosphorous compound over an organic phosphorous compound.

Schiraldi has been cited to show the use of amino-substituted titanium compounds in producing polyesters, but fails to suggest an improvement in resin properties by selection of an inorganic phosphorous compound over an organic phosphorous compound. Quite to the

contrary, the reference describes a hindered phosphate, an organic phosphorous compound, as a catalyst stabilizer (column 5, lines 30-36).

As the cited reference fails to disclose an improved performance in toner applications by preparation of a polyester resin as claimed, the claimed invention is clearly neither anticipated nor made obvious from this reference and accordingly withdrawal of the rejections under 35 U.S.C. § 102(b) and 35 U.S.C. §103(a) are respectfully requested.

Applicants submit this application is now in condition for allowance and early notification of such action is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon

Richard Lee Chinn

Richard L. Chinn, Ph.D.
Registration No. 34,305

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)
RLC:smi